

NOTICE

All drawings located at the end of the document.



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RF/ER-95-0120

Appendix A
Final Sampling and Analysis Plan
For the Downgradient Investigation of
IHSS 119.1

Revision: 1

April 1997

Approved by: [Signature] Date 4/25/97
Approved by: Annette L. Parnis Date 4/25/97
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ADMIN RECCRD

DOCUMENT CLASSIFICATION
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BZ-A-000519

1/19

1.0 INTRODUCTION

The purpose of this appendix to the Sampling and Analysis Plan (RMRS 1995) is to determine whether a source of groundwater contamination is present downgradient of Individual Hazardous Substance Site (IHSS) 119.1, or if the contamination levels present in groundwater downgradient of IHSS 119.1 are the result of upgradient sources. IHSS 119.1 is a former drum and scrap metal storage area which was in use from 1968 to 1971. Volatile organic compounds (VOCs) and some radiological material leaked from drums into the soil resulting in surface radiological and subsurface VOC contamination (DOE 1994). The surficial radiological contamination was removed in 1994 as a hot spot removal action (DOE 1995).

The subsurface VOC contamination present in IHSS 119.1 was delineated by implementation of the original Sampling and Analysis Plan (RMRS 1995). This headspace survey was conducted in January and February 1996 and delineated two sources of groundwater contamination (Figure 1). Background information on IHSS 119.1 and Operable Unit 1 (OU 1) is contained in the Sampling and Analysis Plan (RMRS 1995), the Sampling and Analysis Report (RMRS 1996a), the OU 1 Phase III RCRA Field Investigation/Remedial Investigation (RFI/RI) (DOE 1994), and a hydrogeology and contaminant summary of the IHSS 119.1 area (Dames and Moore 1995).

The current investigation is required in the Corrective Action Decision/Record of Decision (CAD/ROD) Declaration for Operable Unit 1-881 Hillside (DOE 1997). The CAD/ROD requires "confirmatory soil sampling downgradient of IHSS 119.1 to verify that a contaminant source does not exist there." This appendix describes the field investigation to investigate the potential for an additional source of the VOC contaminated groundwater, downgradient of IHSS 119.1. The area to be investigated is located between the southern boundary of IHSS 119.1 and well 0487 (Figure 1).

1.1 Downgradient Plume Contamination Data Summary

VOC contaminated subsurface soils in IHSS 119.1 are suspected to contain residual dense nonaqueous phase liquid (DNAPL) which may be the source of the groundwater contamination in this area. Available IHSS 119.1 data have been summarized in the Sampling and Analysis

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Report (RMRS 1996a). Table 1 summarizes the analytical data from the wells containing the highest contaminant concentrations in groundwater.

Table 1. Maximum Contaminant Concentrations in IHSS 119.1 Groundwater (modified from RMRS 1996a)

Well No.	Compound	Range of Concentrations (ug/L)
0974	Carbon Tetrachloride	Nondetect to 28,000
	1,1-Dichloroethene	Nondetect to 48,000
	1,1,1-Trichloroethane	Nondetect to 30,250
	Tetrachloroethene	430 to 13,200
	Trichloroethene	1,300 to 72,000
1074	Carbon Tetrachloride	441 to 5,000 E
	1,1-Dichloroethene	Nondetect to 140
	1,1,1-Trichloroethane	Nondetect to 312
	Tetrachloroethene	Nondetect to 49
	Trichloroethene	258 to 3,600
4387	Carbon Tetrachloride	Nondetect to 2,995
	1,1-Dichloroethene	Nondetect to 32,687
	1,1,1-Trichloroethane	Nondetect to 15,000
	Tetrachloroethene	64 to 7,590
	Trichloroethene	140 to 15,540

E - Concentration exceeded calibration range of analytical equipment

IHSS 119.1 is located on a south facing hillside where unconsolidated surficial materials overlie weathered claystone bedrock. Groundwater occurs in the unconsolidated surficial materials, primarily in disconnected northwest-southeast trending paleochannels cut into the bedrock surface. Previous investigations located a paleochannel within IHSS 119.1 that continues downgradient where it is intercepted by the French Drain (DOE 1994, Dames and Moore 1995, RMRS 1996b). This paleochannel is approximately 100 feet wide and five feet deep, and directs the groundwater flow to the south (Figure 1). Wells 32591 and 0487 are located within this paleochannel, downgradient of IHSS 119.1, and contain elevated concentrations of VOC contamination in groundwater.

The range of observed VOC concentrations in groundwater samples collected from wells 0487 and 32591 is consistent with, but lower than, the concentrations observed in the IHSS 119.1 wells. Table 2 summarizes the groundwater VOC contaminant concentrations in these wells. The maximum concentrations of the VOCs in groundwater samples from well 0487 were detected in one sample collected in October 1992 and may not be representative of the groundwater contaminant concentrations at this well. There have been 35 groundwater samples collected previous and subsequent to this sample which contained VOC concentrations three to five times lower than the sample taken on October 1992. Because the maximum concentrations

occurred as a one time event, this sample is suspected to be an outlier. These values are noted in Table 2 below.

Table 2. Range of Contaminant Concentrations in Groundwater from Downgradient Wells

Well No.	Compound	Range of Concentrations (ug/l)
0487	Carbon Tetrachloride	Nondetect to 2,600 (330)*
	1,1-Dichloroethene	Nondetect to 14
	1,1,1-Trichloroethane	Nondetect to 20
	Tetrachloroethene	Nondetect to 590 (84)*
	Trichloroethene	Nondetect to 9,500 (1,200)*
32591	Carbon Tetrachloride	Nondetect to 0.1 J
	1,1-Dichloroethene	Nondetect to 6
	1,1,1-Trichloroethane	Nondetect to 2
	Tetrachloroethene	Nondetect to 3
	Trichloroethene	274 to 900

*Highest concentrations present if October 22, 1992 samples are excluded

J - concentration detected below the detection limit

2.0 SAMPLING AND DATA QUALITY OBJECTIVES

The objective of this appendix to the Sampling and Analysis Plan is to determine whether an additional source of groundwater contamination exists downgradient of IHSS 119.1. Data requirements to support this project were developed using criteria established in *Guidance for the Data Quality Objective Process*, EPA QA/G-4 (EPA 1994). The data gaps, study boundaries, and decisions are described below.

The two wells located within the paleochannel downgradient of IHSS 119.1 contain elevated concentrations of VOCs, primarily carbon tetrachloride, tetrachloroethene, and trichloroethene (DOE 1994) (see Table 2). If these contaminants are present as free phase liquids, residual amounts will tend to pool or collect at or near the contact with the underlying claystone bedrock. Therefore, to determine whether DNAPL is present, geoprobe borings will be located within the paleochannel between well 0487 and the IHSS 119.1 southern boundary.

Subsurface soil samples will be collected at each location, either at the top of bedrock or where visible staining or other indications of DNAPLs are present. A Photoionization Detector/Flame Ionization Detector (PID/FID) will be used in the field to scan the core collected to help identify the intervals where DNAPLs may be present. The sample interval with the highest reading will be collected. However, if no high readings are detected, the sample will be collected from the bottom of the interval. Subsurface soil samples will be analyzed for VOCs using method

SW846/SW8260A. If samples contain VOC contamination above the Tier I action levels specified in RFCA (DOE 1996), the need for an action must be evaluated.

3.0 SAMPLING AND ANALYSES

Eleven geoprobe borings will be located approximately 20 feet apart along the trend of the paleochannel between well 0487 and the southern boundary of IHSS 119.1 (see Figure 1). These borings will be spaced so that the deepest portion of the paleochannel is investigated. The southernmost location will be 10 feet north/northwest of well 0487 where the highest concentrations of VOCs in groundwater downgradient of IHSS 119.1 were found. If locations need to be changed to avoid obstructions, or for safety reasons, these changes will be noted in the field logbook. Additional geoprobe holes may be located to further investigate an area or areas of interest if conditions warrant.

The sampling requirements for each type of sample event to be performed under this appendix are described in Table 3. The samples will be screened using the Field Instrument for Detection of Low Energy Radiation (FIDLER), however, based on previous sampling results, radiological screens will not be required as subsurface soils are not contaminated with radiological material. Samples will be handled in accordance with the procedures listed in the original Sampling and Analysis Plan (RMRS 1995), particularly FO.10 - Receiving, Labeling, and Handling Environmental Material Containers, and FO.13 - Containerization, Preserving, Handling and Shipping of Soil and Water Samples. If conditions are encountered in the field which make the use of a procedure unsafe or inappropriate for the task at hand, the specified procedures may be modified or replaced as long as the modification or replacement procedure is justified and detailed in the field logbook, and the resulting data is comparable and adequate to meet the objectives of the project.

Table 3. Analytical Sampling Requirements

Analysis Method	Number of Field Samples	Number of QC Samples	Total Number Samples	Containers, Preservatives, Holding Times
Total VOCs by SW846/8260A	11	1 duplicate (1 per 20 samples) 1 rinsate (1 per 20 samples) 3 trip blanks (1 per shipment)	16	250 ml wide mouth, teflon lined, glass jar, 4° C, 14 days for soils 2 40 ml glass vials, teflon lined, glass jar, HCl to pH < 2 and 4° C, 14 days for water

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3.1 Field Preparation

Before data collection begins, each geoprobe location will be established with tape and compass, using the existing wells as reference points. The locations will be marked with reference stakes or flags with the unique number for that location. The geoprobe location number will be obtained from Rocky Flats Environmental Database and correlated with sample analyses for that location. After completion of the geoprobe investigation, these locations will be surveyed for location and elevation using GPS receivers operated in accordance with the equipment manuals (Ashtech 1993), or with equivalent equipment.

3.2 Geoprobe Samples

All geoprobe boreholes will be advanced to a depth of two feet into bedrock, for a total depth expected not to exceed 20 feet. If refusal occurs prior to reaching bedrock, up to two offsets will be pushed to attempt to reach the sampling objectives. Geoprobe operations will be conducted as per GT.39 Push Subsurface Soil Sample.

Core samples will be collected continuously in two to five foot increments from the surface to approximately two feet into bedrock. These core samples will be monitored with a FIDLER, and in accordance with FO.15 - Photoionization Detectors and Flame Ionization Detectors, visually inspected for signs of DNAPL or other contaminant staining, and then visually logged by the field geologist as per GT.01 - Logging Alluvial and Bedrock Material.

Soil samples will be collected for analyses as described in Table 3 from every geoprobe hole to determine whether VOC source material is present in the subsurface soils. Samples collected for laboratory analysis of VOCs will be taken from discrete intervals where there are indications of contaminants, or from the section of the colluvium immediately above the bedrock.

4.0 DATA MANAGEMENT

Data management and procedural requirements are the same as documented in the original Sampling and Analysis Plan (RMRS 1995).

4.1 Project Completion

The results will be compiled into a brief report and map. The location and analytical data will be entered into and stored in the Rocky Flats Environmental Database. At the end of the project, all records and field documentation will be turned over to the records center.

4.2 Quality Assurance

Analytical data collected in support of this investigation will be evaluated using the guidance established by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08.02 - Evaluation of ERM Data for Usability in Final Reports. This procedure establishes the guidelines for evaluating analytical data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. For precision, typically the relative percent difference between samples and duplicates is less than or equal to 40% for soil. Accuracy of the laboratories will be obtained by using laboratories as directed by the APO. Comparability will be evaluated by using standardized methods for the collection and analysis of samples. Completeness will be evaluated by comparing the proposed sampling program to the field program as completed. A goal of 90% is required.

5.0 REFERENCES

Ashtech, 1993 , *Ashtech XII GPS Receiver Operating Manual, Version 7*, March.

Dames and Moore, 1995, *Summary and Interpretation of Contaminant Hydrogeological Conditions at IHSS 119.1, OUI, 881 Hillside, Rocky Flats Environmental Technology Site, Colorado*, August 1995.

DOE, 1994, *Final Phase III RFI/RI Rocky Flats Plant, 881 Hillside Area (Operable Unit No. 1)*, June 1994.

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DOE, 1997, *Corrective Action Decision, Record of Decision Declaration, Rocky Flats Environmental Technology Site, Operable Unit 1: 881 Hillside Area, Jefferson County, Colorado*.

EPA, 1994, *Guidance for Planning for Data Collection in Support of Environmental Decision Making Using the Data Quality Objectives Process*, EOA QA/G-4.

RMRS, 1995, *Sampling and Analysis Plan, Identification and Delineation of Groundwater Contaminant Source Area for Excavation Design Purposes, Individual Hazardous Substance Site 119.1, Operable Unit 1*, RF/ER-95-0120

RMRS, 1996a, *Sampling and Analysis Report, Identification and Delineation of Contaminant Source Area for Excavation Purposes, Individual Hazardous Substance Site 119.1, Operable Unit 1*, RF/ER-96-0027.UN

RMRS, 1996b, *Final Revised Groundwater Conceptual Plan for the Rocky Flats Environmental Technology Site*, RF/ER-95-0121.UN, September.

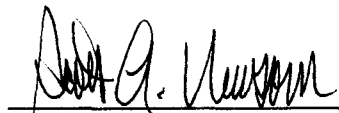
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Appendix B
Final Sampling and Analysis Plan for
Implementation Samples for the
IHSS 119.1 Source Removal Project

Revision: 1

April 1997

Approved by:

 Date 4/25/97

Approved by:

Annette L. Pannozzi Date 4/25/97

Approved by:

Gregg D. Higgins Date 4/28/97

1.0 INTRODUCTION

The purpose of this appendix to the Sampling and Analysis Plan (RMRS 1995) is to direct collection of additional characterization samples from the IHSS 119.1 source area in order to determine whether a radiological work permit is required, complete the health and safety plan, and provide data for the Air Pollution Emission Notice (APEN). The final determination for radiological requirements and posting will be based on an approved statistically defensible data evaluation. The data derived from implementation of this plan as well as previously acquired data may be used to make this final determination for radiological requirements and posting.

IHSS 119.1 is a former drum and scrap metal storage area used from 1968 to 1971. Volatile organic compounds (VOCs) and some radiological material leaked from drums into the soil resulting in surface radiological and subsurface VOC contamination (DOE 1994). The surficial radiological contamination was removed in 1994 as a hot spot removal action (DOE 1995). The original sampling and analysis plan was implemented in January and February 1996, and delineated two volatile organic compound sources of the groundwater contamination seen in and downgradient of IHSS 119.1 (Figure 1). These areas will be excavated during implementation of the OU 1 Corrective Action Decision/Record of Decision (DOE 1997) in Summer 1997.

The primary sources for information on IHSS 119.1 and Operable Unit 1 (OU 1) are the Sampling and Analysis Plan (RMRS 1995), the Sampling and Analysis Report (RMRS 1996), the OU 1 Phase III RCRA Field Investigation/Remedial Investigation (RFI/RI) (DOE 1994), and a hydrogeology and contaminant summary of the IHSS 119.1 area (Dames and Moore 1995). Table 1 summarizes the analytical data from the wells containing the highest contaminant concentrations in groundwater.

Table 1. Maximum Groundwater Contaminant Concentrations in IHSS 119.1 (modified from RMRS 1996)

Well No.	Compound	Range of Concentrations (ug/L)
0974	Carbon Tetrachloride	Nondetect to 28,000
	1,1-Dichloroethene	Nondetect to 48,000
	1,1,1-Trichloroethane	Nondetect to 30,250
	Tetrachloroethene	430 to 13,200
	Trichloroethene	1,300 to 72,000
1074	Carbon Tetrachloride	441 to 5,000 E
	1,1-Dichloroethene	Nondetect to 140
	1,1,1-Trichloroethane	Nondetect to 312
	Tetrachloroethene	Nondetect to 49
	Trichloroethene	258 to 3,600
4387	Carbon Tetrachloride	Nondetect to 2,995
	1,1-Dichloroethene	Nondetect to 32,687
	1,1,1-Trichloroethane	Nondetect to 15,000
	Tetrachloroethene	64 to 7,590
	Trichloroethene	140 to 15,540

E - Concentration exceeded calibration range of analytical equipment

2.0 SAMPLING AND DATA QUALITY OBJECTIVES

The objective of this appendix to the Sampling and Analysis Plan is to collect additional characterization samples to determine whether a radiological work permit is required, to determine the existing hazards sufficiently to complete the health and safety plan, and to provide information for completing the APEN. Data requirements to support this project were developed using criteria established in *Guidance for the Data Quality Objective Process*, EPA QA/G-4 (EPA 1994). The data gaps, study boundaries, and decisions are described below.

While the 1996 field investigation determined the location of the source areas within IHSS 119.1, no radiological samples were collected to determine whether radiological contamination exists at depth (RMRS 1996). Headspace analyses of subsurface soil samples were conducted to delineate the excavation area; however, quantitative analyses for VOCs are required for the health and safety plan and APEN.

IHSS 119.1 is located on a south facing hillside where unconsolidated surficial materials overlie weathered claystone bedrock. The contamination found at IHSS 119.1 is a result of leaking drums at the surface, or surface spills. The VOC contamination is made up of carbon tetrachloride, 1,1-dichloroethene, 1,1,1-trichloroethane, tetrachloroethene and trichloroethene, which are dense nonaqueous phase liquids (DNAPLs) that tend to collect at impermeable boundaries, such as at the claystone bedrock surface. While the radiological contamination was originally associated with the VOC contamination, it is not expected to occur at depth because

the radiological contamination does not exist in a dissolved phase, and there are no significant transport mechanisms which would allow migration.

To determine the radiological concentrations at depth, three geoprobe borings will be located within the highest concentration area of each of the two source areas delineated by the previous investigation (see Figure 1). Radiological samples will be collected for the interval of 0 to 2.5 feet, and the interval of 2.5 to 5 feet. As the radiological contamination and VOC contamination resulted from the same spills, sampling at these locations should ensure that the highest levels of radiological contamination are also detected for each area.

Samples will be collected for VOC analyses to assist with developing the Health and Safety Plan, and for generating an APEN for this project. For the VOC samples, subsurface soil samples will be collected at 5 foot intervals at each location to a depth of approximately 2 feet into bedrock, or where visible staining or other indications of DNAPLs are present. A Photoionization Detector/Flame Ionization Detector (PID/FID) will be used in the field to scan the core collected to help identify the intervals where DNAPLs may be present. Bedrock is expected to be encountered between 10 and 20 feet below ground surface in the excavation areas.

If the bedrock is highly weathered, which would allow DNAPLs to migrate deeper than the bedrock surface, samples will be collected to 20 feet, which is the probable excavation depth limit. If geoprobe refusal is encountered higher, two offsets will be tried. If there is no success in penetrating below a given depth, this will be taken as an indication of an impermeable layer which would prevent further migration of DNAPLs, and the boring will be terminated at that location. Samples collected will be analyzed for VOCs using method SW846/SW8260A.

3.0 SAMPLING AND ANALYSES

Six geoprobe borings will be located within the 60 parts per million (ppm) contours for volatile chlorinated hydrocarbon head space concentrations delineated by the 1996 field investigation (RMRS 1996) (Figure 1). A statistical approach was used to determine the grid spacing for the sampling based upon the methods developed by R. O. Gilbert (1987) for locating hotspots. To determine the grid spacing for each area, the following information is required:

1. The degree of confidence for locating the hotspot (β),
2. The shape of the spill (S), either a circle or an ellipse,
3. The length of the radius of the semi-major axis (L), and
4. The grid spacing and type, whether a square, rectangle or triangle.

For the larger, western area, to obtain a degree of confidence of 90% that the source would be located, assuming an elliptical source area that is approximately 13 feet by 25 feet, and a square grid type, the calculated grid spacing is 15 feet. The size of the original spill was assumed to be smaller than the size of the present 60 parts per million contour as the contamination should spread out as it descends vertically to bedrock.

For the eastern area, to obtain a degree of confidence of 90% that the source would be located, a source area with a circular shape with a radius of 9 feet, and a square grid type, the calculated grid spacing is 16 feet. However, another sample will be added in the midpoint of the area as this location should contain the highest concentrations of contaminants, and will provide beneficial data for the health and safety plan and APEN (Figure 1).

An additional four geoprobe borings will be installed to try to locate the source of groundwater contamination in IHSS 119.1. One geoprobe boring will twin well 0974 which has the highest historical groundwater contaminant concentrations, but does not have associated subsurface soil analyses. Another geoprobe boring will twin well 1074 which has contaminant concentrations in groundwater above Tier I action levels, but also does not have associated subsurface soil analyses. One geoprobe boring will be located inside the largest of the previously excavated hotspot (west of geoprobe boring 12397). One geoprobe boring will be located to the north of the collection well (CW001), if possible within 5 feet (see Figure 1).

Effective Date 6/2/97

If locations must be changed to avoid obstructions, or for safety reasons, these changes will be noted in the field logbook. Additional geoprobe holes may be located to further investigate an area or areas of interest if conditions warrant.

The sampling requirements for each type of sample event to be performed under this appendix are described in Table 3. Samples will be handled in accordance with the procedures listed in the original Sampling and Analysis Plan (RMRS 1995), particularly FO.10 - Receiving, Labeling, and Handling Environmental Material Containers, and FO.13 - Containerization, Preserving, Handling and Shipping of Soil and Water Samples. If conditions are encountered in the field which make the use of a procedure unsafe or inappropriate for the task at hand, the specified procedures may be modified or replaced as long as the modification or replacement procedure is justified and detailed in the field logbook, and the resulting data is adequate to meet the objectives of the project.

Table 3. Analytical Sampling Requirements

Analysis Method	Number of Field Samples	Number of QC Samples	Total Number Samples	Containers, Preservatives, Holding Times
Total VOCs by SW846/8260A	18	1 duplicate (1 per 20 samples) 1 rinsate (1 per 20 samples)	20	250 ml wide mouth, teflon lined, glass jar, 4° C, 14 days for soils 2 40 ml glass vials, teflon lined, HCl to pH < 2 and 4° C, 14 days for water
Radionuclides by Gamma Spectroscopy	12	1 duplicate (1 per 20 samples) 1 rinsate (1 per 20 samples)	14	250 ml wide mouth glass jar, NA, 6 months 1 liter glass jar, NA, 6 months

3.1 Field Preparation

Before data collection begins, each geoprobe location will be established with tape and compass, using the existing wells as reference points. The locations will be marked with reference stakes or flags with the unique number for that location. The geoprobe location number will be obtained from Rocky Flats Environmental Database System and correlated with sample analyses for that location.

3.2 Geoprobe Samples

All geoprobe boreholes will be advanced to a depth of two feet into bedrock. This depth is expected not to exceed 20 feet, however, no borehole will exceed a depth of 30 feet, the limit of

the available equipment. If refusal occurs prior to reaching bedrock, up to two offsets will be pushed to attempt to reach the sampling objectives. Geoprobe operations will be conducted as per GT.39 Push Subsurface Soil Sample.

Core will be collected continuously in two to five foot increments from the surface to approximately two feet into bedrock. The core will be screened using the Field Instrument for Detection of Low Energy Radiation (FIDLER); however, based on previous sampling results, radiological screens will not be required as subsurface soils are not contaminated with radiological material. The core will be monitored in accordance with FO.15 - Photoionization Detectors and Flame Ionization Detectors, visually inspected for signs of DNAPL or other contaminant staining, and then visually logged by the field geologist as per GT.01 - Logging Alluvial and Bedrock Material.

Soil samples will be collected from the core for analyses as described above and in Table 3. Radiological samples will be composited from the 0 to 2.5 foot interval and from the 2.5 to 5 foot interval to determine the concentration of radiological contamination present in the subsurface soils. If FIDLER screening of the core indicates the presence of contamination deeper than 5 feet, a sample will be collected from that interval also. Samples collected for laboratory analysis of VOCs will be taken from discrete intervals where there are indications of contaminants, or from every five foot interval.

Effective Date 6/2/97

If field screening for VOCs indicates the presence of total VOCs at a concentration of 5 parts per million or greater, a split sample will be collected for use in calibrating the field screening equipment expected to be used during the remedial action to guide the excavation. These split samples will be given the same sample numbers as the samples to be analyzed by the lab, but with a suffix of "F" to identify these as field screen samples. Data from these samples will only be used to calibrate the excavation field screening equipment.

3.3 Abandonment of Geoprobe Locations

After completion of sampling at each location, the geoprobe hole will be abandoned in accordance with procedure Plugging and Abandonment of Boreholes (5-21000-ER-OPS-GT.05) except that boreholes will be backfilled with powdered or granular bentonite from ground surface

and not tremmied. Each location will be identified with the unique location number assigned, with indelible ink either on a wooden lathe or pin flag.

Within two weeks of completion of the geoprobe investigation, these locations will be surveyed for location and elevation using GPS receivers operated in accordance with the equipment manuals (Ashtech 1993), or with equivalent equipment.

4.0 DATA MANAGEMENT

Data management and procedural requirements are the same as documented in the original Sampling and Analysis Plan (RMRS 1995).

4.1 Project Completion

The results will be compiled into a brief report and map. The location and analytical data will be entered into and stored in the Rocky Flats Environmental Database System. At the end of the project, all records and field documentation will be turned over to the records center.

4.2 Quality Assurance

Analytical data collected in support of this investigation will be evaluated using the guidance established by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08.02 - Evaluation of ERM Data for Usability in Final Reports. This procedure establishes the guidelines for evaluating analytical data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. For precision, typically the relative percent difference between samples and duplicates is less than or equal to 40% for soil. Accuracy of the laboratories will be obtained by using laboratories as directed by the APO. Comparability will be evaluated by using standardized methods for the collection and analysis of samples. Completeness will be evaluated by comparing the proposed sampling program to the field program as completed.

5.0 REFERENCES

Ashtech, 1993 , *Ashtech XII GPS Receiver Operating Manual, Version 7*, March.

Dames and Moore, 1995, *Summary and Interpretation of Contaminant Hydrogeological Conditions at IHSS 119.1, OUI, 881 Hillside, Rocky Flats Environmental Technology Site, Colorado*, August 1995.

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DOE, 1997, *Corrective Action Decision, Record of Decision Declaration, Rocky Flats Environmental Technology Site, Operable Unit 1: 881 Hillside Area, Jefferson County, Colorado*.

Gilbert, R.O., 1987, *Statistical Methods for Environmental Pollution Monitoring*.

RMRS, 1995, *Sampling and Analysis Plan, Identification and Delineation of Groundwater Contaminant Source Area for Excavation Design Purposes, Individual Hazardous Substance Site 119.1, Operable Unit 1, RF/ER-95-0120*

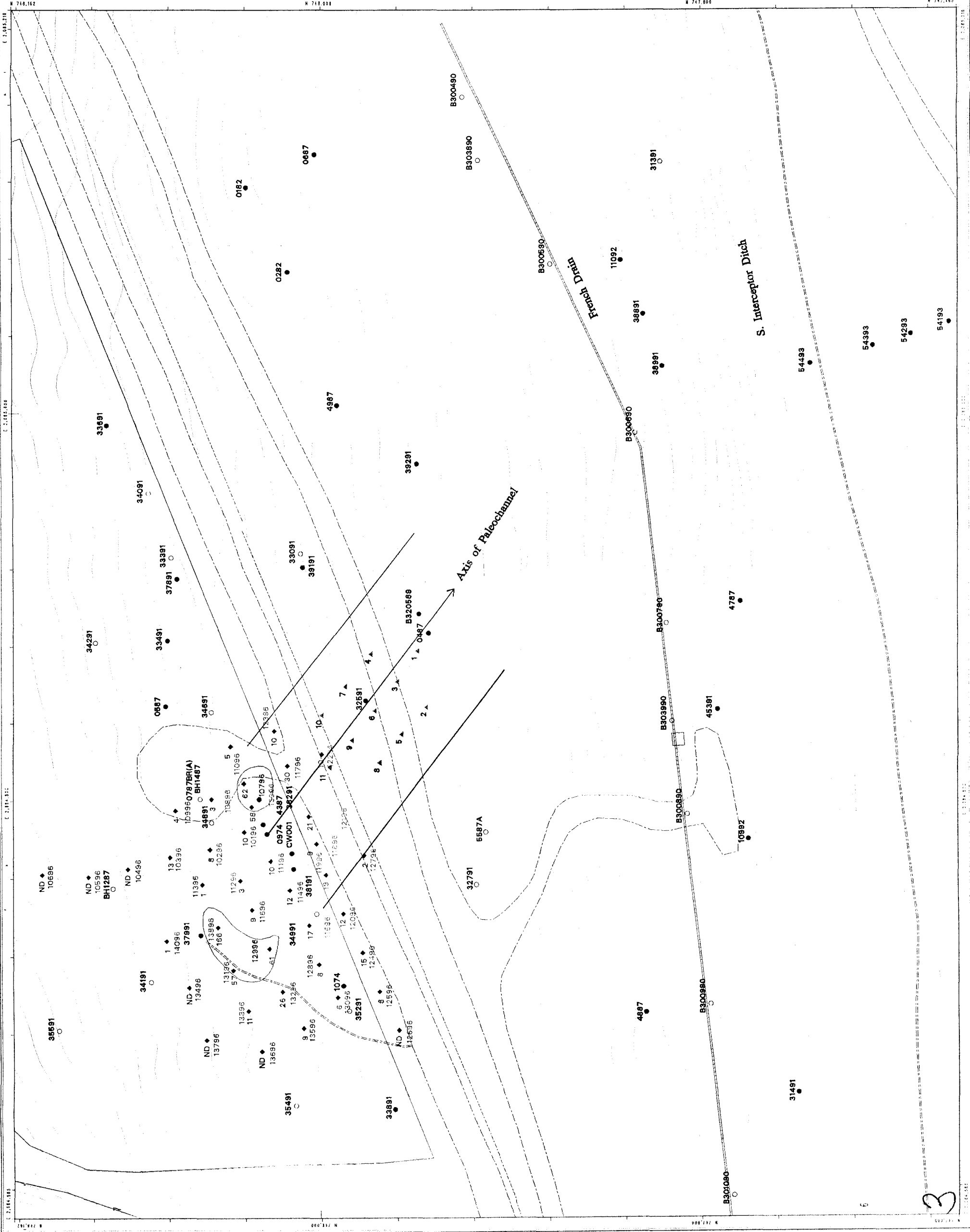
RMRS, 1996, *Sampling and Analysis Report, Identification and Delineation of Contaminant Source Area for Excavation Purposes, Individual Hazardous Substance Site 119.1, Operable Unit 1, RF/ER-96-0027.UN*

EXPLANATION

- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences
- Paved roads
- Dirt roads

U.S. Department of Energy
Rocky Flats Environmental Technology Site

MAP ID: 97-0077



881 Hillside Area (OUI)
In the Vicinity of IHSS 119.1
Proposed Geoprobe Location
and Headspace Concentrations
Figure 1

EXPLANATION

- △ Pre-1986 Wells (Abandoned)
- ◆ Soil Gas Borehole Locations
- Groundwater Wells (Alluvium)
- Groundwater Wells (Bedrock)
- ▼ Proposed Sample Location for Radionuclide and VOCs
- ▼ Additional Proposed Sample Location for Radionuclide and VOCs
- ⊕ Piezometers
- ∖ Individual Hazardous Substance Sites
- ∖ Fences
- ∖ Dirt Roads
- ∖ Contour Intervals 10 ppm

ND = Not Detected
NS = Not Sampled
Head Space readings in ppm
Detection limit 0.1 ppm

Concentrations represent
greatest readings from 0-22
feet below grade

Estimated excavation Area using
20ppm head space concentration
as the cut off.

Estimated excavation area using
50ppm head space concentration
as the cut off.

DATA SOURCE:
Ground Water data provided by
Rocky Mountain Remediation Services, LLC
Soil Gas Borehole data provided by
Rocky Mountain Remediation Services, LLC
Borehole Sampling locations provided by
Geosciences.

Scale = 1 : 210
1 inch represents approximately 15 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared
by:

Rocky Mountain
Remediation Services, LLC
Geographic Information Systems Group
P.O. Box 454
Boulder, CO 80502-0454

MAP ID: 97-0082

May 23, 1997

